

Stockbridge Company Solutions (see *Note* on pg. 10-5)**P10-1****a. Table of entities and activities for Stockbridge Company**

Entities	Para	Activities
Customer	2	1. Call Stockbridge fulfillment center and give name to CSR.
CSR	2	2. Key enter customer name.
ERP system (computer)	2	3. Retrieve customer data and display onscreen.
CSR	2	4. Examine display.
Customer	2	5. Give items and quantities.
CSR	2	6. Key enter order.
Computer	2	7. Compare amount of the order to available credit.
	2	8. Allocate inventory.
CSR		9. Save order.
Computer	2	10. Create sales order record.
	2	11. Print picking ticket in the warehouse.
	2	12. Display sales order number.
CSR	2	13. Read sales order number to customer.
Warehouse (clerk)	3	14. Pick goods from shelf.
	3	15. Record quantity and lot number.
	3	16. Bring goods and picking ticket to shipping department.
Shipping department (clerk)	3	17. Scan sales order number into computer.
Computer	3	18. Display the sales order master data.
Shipping department (clerk)	3	19. Scan the items and quantities being shipped.
	3	20. Save the shipment data.
Computer	3	21. Update the sales order master data and inventory (for the shipment).
	3	22. Create a record on the billing due list data store.
	3	23. Print a packing slip.
Shipping department	3	24. Attach packing slip to goods.

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(clerk)	3	25. Give goods to carrier.
Carrier	3	

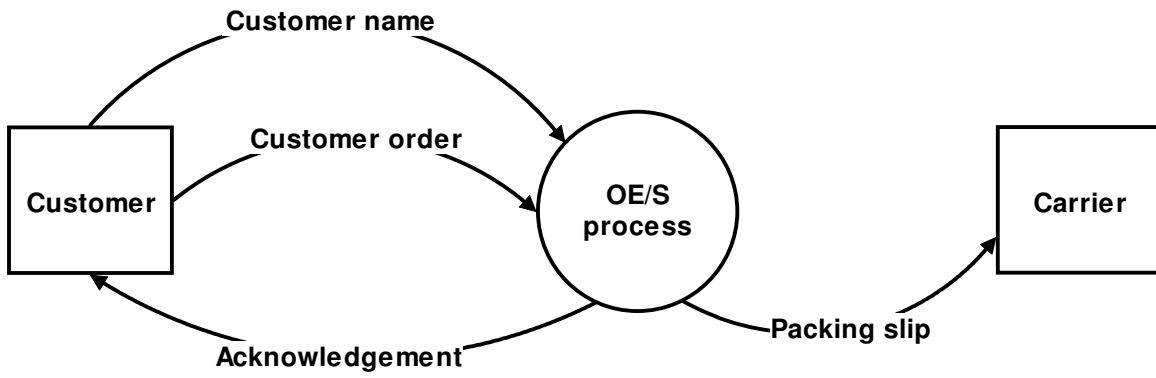
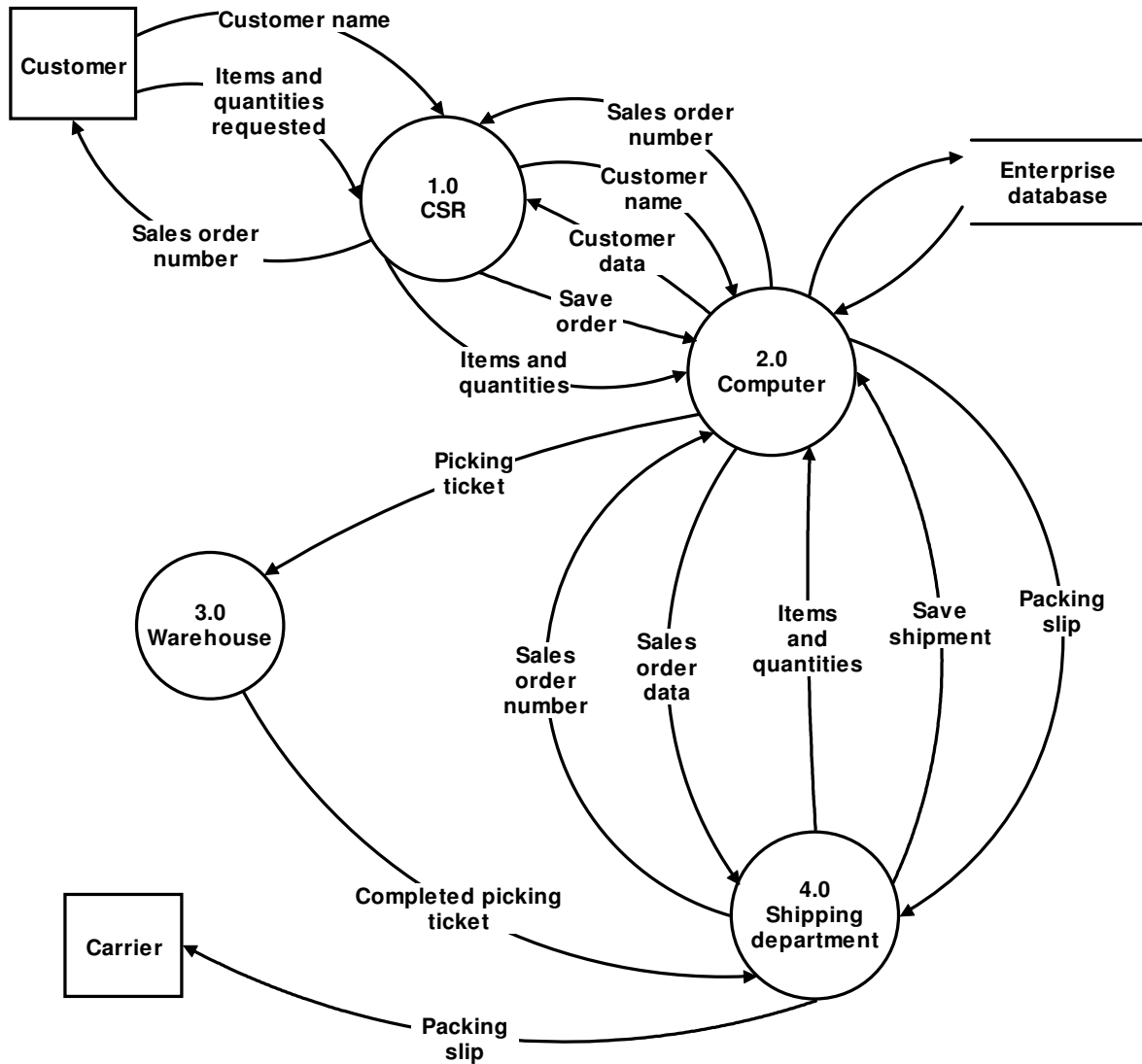


FIGURE SM-10.1 Problem 1, part b solution—context diagram for Stockbridge Company



NOTE: See the logical DFD for details regarding flows into and out of the enterprise database.

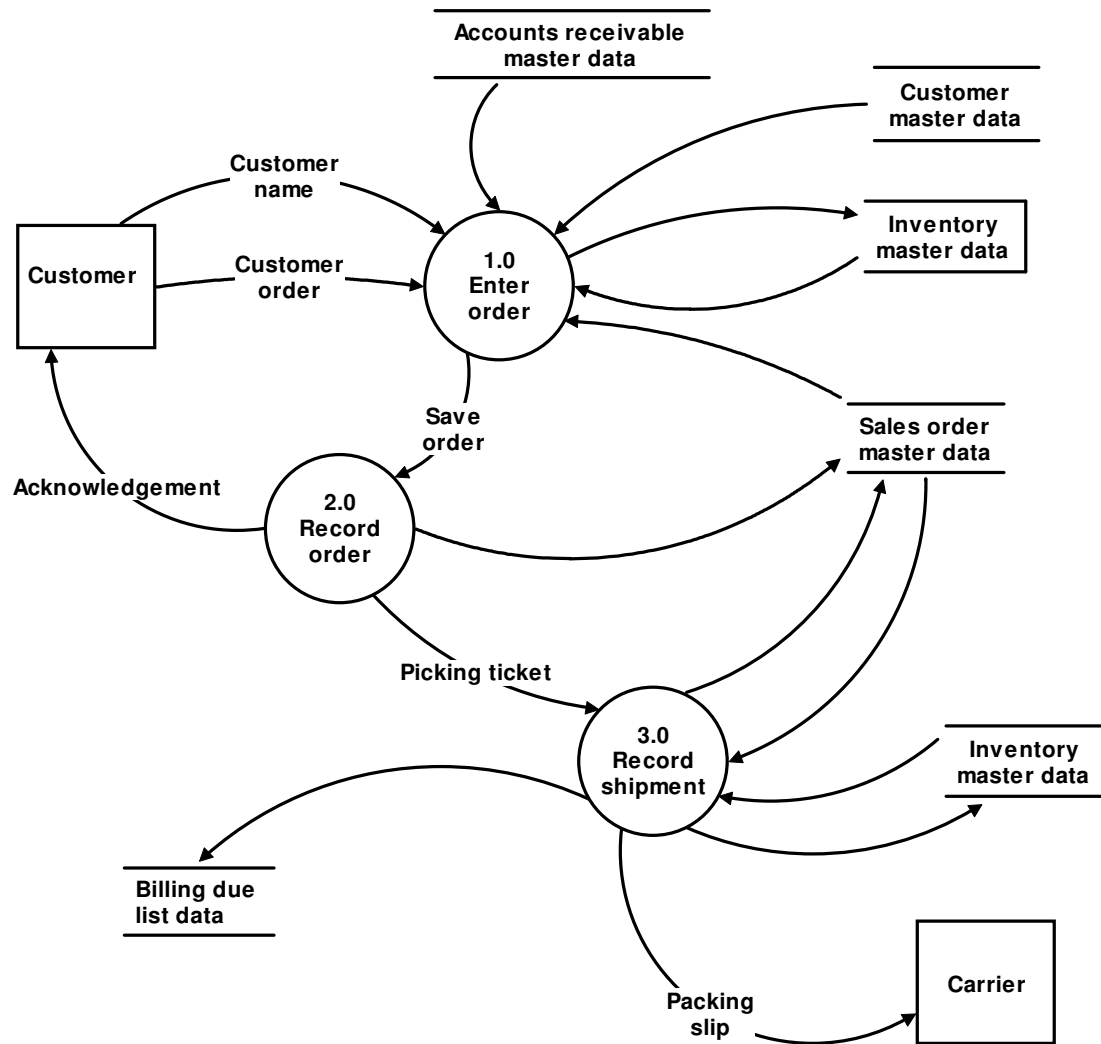
FIGURE SM-10.2 Problem 1, part c solution—physical DFD for Stockbridge Company

d. Table of Entities and Activities (Annotated) for Stockbridge Company

Entities	Para	Activities	Process
CSR	2	2. Key enter customer name.	<i>1.0 Enter order</i>
ERP System (computer)	2	3. Retrieve customer data and display onscreen.	
CSR	2	4. Examine display.	
	2	6. Key enter order.	

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Computer	2	7. Compare amount of order and available credit.	
	2	8. Allocate inventory.	
CSR		9. Save order.	
<hr/>			
Computer	2	10. Create sales order record.	
	2	11. Print picking ticket in warehouse.	2.0 Record order
	2	12. Display sales order number.	
<hr/>			
Warehouse clerk	3	15. Record quantity and lot number.	
Shipping clerk	3	17. Scan sales order number into computer.	
Computer	3	18. Display sales order data.	
Shipping clerk	3	19. Scan the items and quantities being shipped.	
	3	20. Save the shipment data.	
Computer	3	21. Update the sales order master data and inventory.	3.0 Record shipment
	3	22. Create a record on the billing due list data store.	
	3	23. Print packing slip.	
	3	24. Attach packing slip to goods.	
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NOTE: Assumes that credit check requires review of open sales orders and outstanding accounts receivable

FIGURE SM-10.3 Problem 1, part e solution—logical DFD for Stockbridge Company

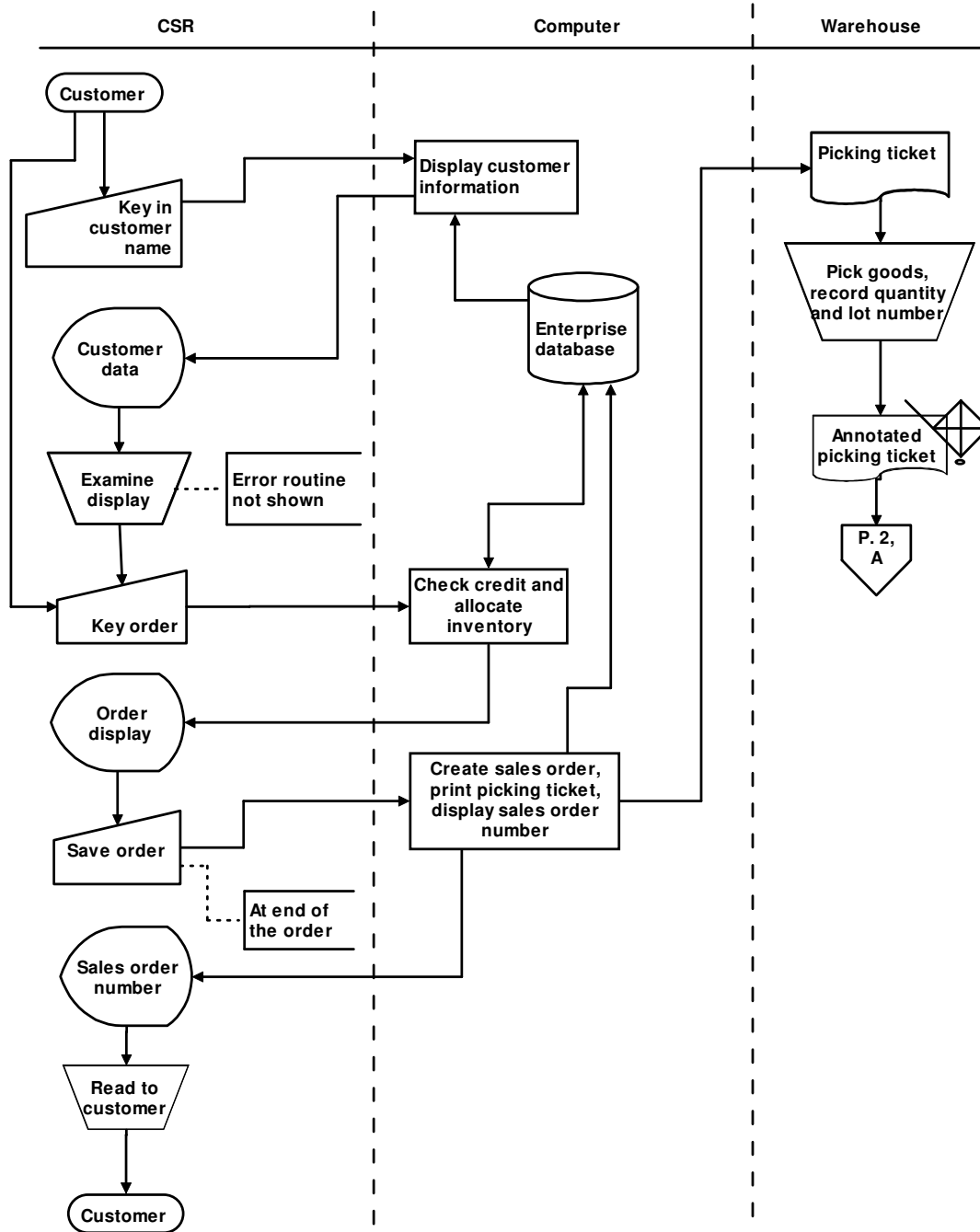
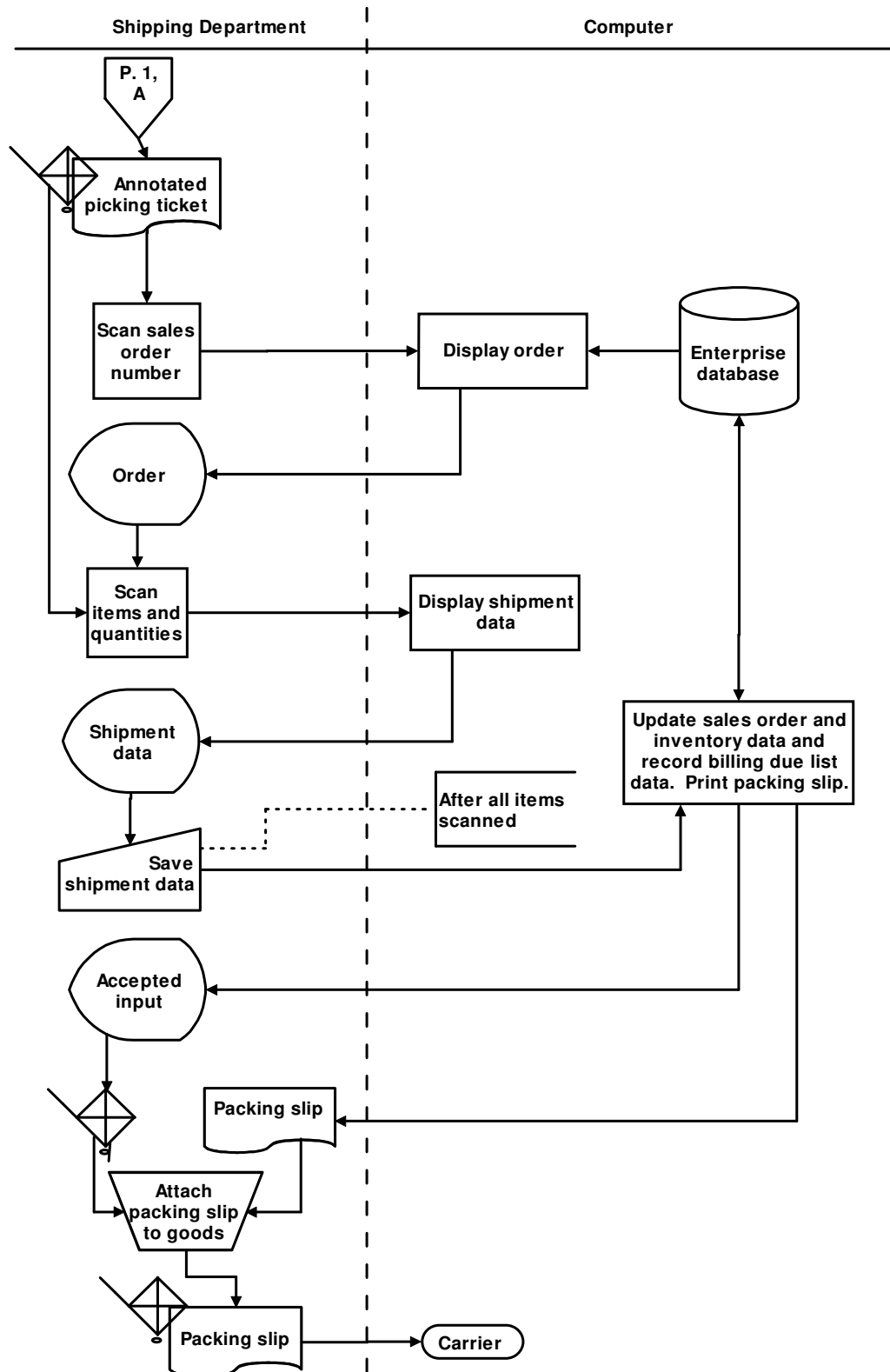


FIGURE SM-10.4 Problem 2, part a solution—systems flowchart for Stockbridge

FIGURE SM-10.4 Stockbridge systems flowchart (*continued*)

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Recommended control plans	Control Goals of the Stockbridge OE/S Business Process														
	Control Goals of the Operations Process					Control Goals of the Information Process									
	Ensure effectiveness of operations:			Ensure efficient employment of resources (computers, people)	Ensure security of resources (inventory, customer data)	For sales order inputs (i.e., customer orders), ensure:			For sales order master data, ensure:		For sales order notification inputs (i.e., shipment data), ensure:			For sales order master data, ensure:	
	A	B	C			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
Present controls															
P-1: Enter customer order close to the location where it is prepared	P-1		P-1	P-1			P-1	P-1							
P-2: Populate input screens with master data	P-2		P-2	P-2		P-2		P-2							
P-3: Independent customer master data maintenance		P-3			P-3	P-3									
P-4: Compare input data with master data					P-4	P-4		P-4							
P-5: Procedures for rejected inputs							P-5								
P-6: Online prompting	P-6		P-6	P-6				P-6							
P-7: Preformatted screens	P-7		P-7	P-7				P-7							
P-8: Customer credit check		P-8			P-8	P-8									
P-9: Confirm input acceptance							P-9								
P-10: Turnaround document			P-10	P-10							P-10		P-10		

Recommended control plans	Control Goals of the Stockbridge OE/S Business Process														
	Control Goals of the Operations Process					Control Goals of the Information Process									
	Ensure effectiveness of operations:			Ensure efficient employment of resources (computers, people)	Ensure security of resources (inventory, customer data)	For sales order inputs (i.e., customer orders), ensure:			For sales order master data, ensure:		For sales order notification inputs (i.e., shipment data), ensure:			For sales order master data, ensure:	
	A	B	C			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
(picking ticket)															
P-11: Enter shipment data in shipping			P-11								P-11	P-11	P-11		
P-12: Independent shipping authorization					P-12						P-12				
P-13: Compare input data with master data			P-13	P-13	P-13						P-13		P-13		
P-14: Confirm input acceptance												P-14			
Missing Controls															
M-1: One-for-one checking of picking ticket with goods			M-1	M-1	M-1						M-1		M-1		
M-2: One-for-one checking of goods, picking ticket, and sales order data					M-2						M-2		M-2		
M-3: Procedures for rejected inputs												M-3			
M-4: One-for-one checking of packing slip and goods											M-4	M-4	M-4		

Recommended control plans	Control Goals of the Stockbridge OE/S Business Process														
	Control Goals of the Operations Process					Control Goals of the Information Process									
	Ensure effectiveness of operations:			Ensure efficient employment of resources (computers, people)	Ensure security of resources (inventory, customer data)	For sales order inputs (i.e., customer orders), ensure:			For sales order master data, ensure:		For sales order notification inputs (i.e., shipment data), ensure:			For sales order master data, ensure:	
	A	B	C			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
	M-5: Procedures for rejected inputs											M-3			
M-6: Review open sales order (tickler file)			M-6									M-6			

Possible effectiveness goals include the following:

- A — Provide timely acknowledgement of customer orders
- B — Provide assurance of customer's credit worthiness
- C — Provide timely shipment of goods to customers

IV = input validity

IC = input completeness

IA = input accuracy

UC = update completeness

UA = update accuracy

See Exhibit SM-10.1 for a complete explanation of control plans and cell entries.

FIGURE SM-10.5 Problem 2, part b solution (partial)—control matrix for Stockbridge Company

Exhibit SM-10.1 Problem 2, part b solution (partial) – explanation of cell entries for control matrix in Figure SM-10.5

Note: All inputs result in immediate updates to master data. Therefore, we do not show entries for UC or UA.

P-1: *Enter order close to the location to where it is prepared.*

Effectiveness goals A and C: Orders are entered by CSRs while the customer is on the phone. This places the CSRs in a position to give the customer an immediate acknowledgement (goal A) and to get the goods shipped quickly (goal C) as no order entry step intervenes.

Ensure efficient employment of resources: The direct entry of approved orders by CSRs *provides* for a more efficient employment of resources because no additional Stockbridge employees are involved.

Sales order input completeness and input accuracy: The direct entry by CSRs provides less chance for the orders to be lost, thus improving input completeness. Because the CSR has the customer on the phone and can correct any input errors on the spot, input accuracy should be improved.

P-2: *Populate input screens with master data.*

Effectiveness Goals A and C: Fewer operator keystrokes should improve the speed with which orders can be entered.

Ensure efficient employment of resources: Populating inputs with master data can improve the efficiency of online processes by reducing the quantity of data that an operator must enter into a computer and increasing the number of orders that they can process.

Sales order input validity: The data entry process can only proceed if there is an authorized customer record on the customer database.

Sales order input accuracy: Fewer operator keystrokes should further improve the accuracy of data entry; the data that is populated was previously entered and edited and has proved to be accurate over time.

P-3: *Independent customer master data maintenance.*

Effectiveness goal B: We assume that only personnel in the credit department, a function that is separate from customer service, approve the credit limit and add new customers to the customer master data.

Security of resources: By precluding sales to customers who may not be creditworthy, the organization helps to ensure the security of its resources.

Input validity: Valid *sales* orders include those that are made to customers for whom management has provided prior authorization. This is accomplished here by having the records entered by the credit department.

P-4: *Compare input data with master data.*

Security of resources, sales order input validity, and sales order input accuracy: CSRs compare the input customer name to the computer display to ensure that orders are input for the correct customer and only for customers who are known to exist. The record that is retrieved from the customer database determines that the customer has been approved.

P-5: *Procedures for rejected inputs.*

Sales order input completeness: We assume that the CSR follows some error-correcting procedure when the displayed customer data and the input customer name do not. These procedures should ensure the correction and re-input of all (i.e., completeness) rejected orders.

P-6: *Online prompting.*

Effectiveness Goals A and C, efficient employment of resources: By asking questions and providing online guidance, this plan ensures a quicker data entry process (Goal A) and allows the user to input more data over a period of time (Efficiency).

Sales order input accuracy: The online guidance should reduce input errors.

P-7: *Preformatted screens.*

Effectiveness goals A and C, efficient employment of resources: This simplifies the data entry process, allowing the CSR to enter orders more quickly and allowing more orders to be input over a period of time.

Sales order input and update accuracy: Preformatted screens may prevent the CSR from omitting data, populate certain fields, and reject incorrectly formatted fields, thus reducing input errors.

P-8: *Customer credit check.*

Effectiveness goal B: The customer's credit limit is checked by comparing the order amount to the credit limit on the customer master data and the outstanding orders and receivables. By dealing only with customers who have demonstrated an ability to satisfy their liabilities, Stockbridge can reduce their losses.

Security of resources: Termination of the order for lack of credit ensures that the organization protects its resources by dealing only with customers who have demonstrated an ability to satisfy their liabilities.

Sales order input validity: Because valid sales orders are those that fall within preauthorized credit limits, this plan also speaks to the goal input validity.

P-9: *Confirm input acceptance.*

Sales order input completeness: Ensures input completeness in that the computer displays the sales order number, thus *informing* the CSR that the order has been accepted and recorded.

P-10: *Turnaround document (picking ticket).*

Effectiveness goal C, efficient employment of resources: By reducing the amount of data that must be input to record the shipment, we improve the speed and productivity of the shipping personnel.

Shipping notice input validity: The turnaround documents were printed in the warehouse. Thus, the shipping clerks are precluded from entering unauthorized shipments.

Shipping notice input accuracy: Using the prerecorded bar code to trigger the shipment reduces the possibility of input errors.

P-11: *Enter shipment data in shipping.*

Effectiveness goal C: By entering the shipment data in shipping, shipments are timelier.

Ensure efficient employment of resources: By entering the shipment data in shipping, resources are more efficiently used than they would be if Stockbridge sent the shipping notices to a separate data entry function.

Sales order notification input validity: The entry of the shipment is undertaken by shipping clerks who, presumably, are in possession of goods that will actually be shipped.

Sales order notification input completeness and input accuracy: By entering the shipment data in shipping, the shipment data should not be lost (completeness) and should be accurately input by personnel who are familiar with the event and can correct any input errors on the spot.

P-12: *Independent shipping authorization.*

Ensure security of resources: To provide security over merchandise inventory, the shipping department has an independent authorization—the record on the sales order master data—to ship inventory to a customer.

Sales order notification input validity: To ensure the validity of shipping notices, the shipping department has an independent authorization—the record on the sales order master data—to record a shipment.

P-13: *Compare input data with master data.*

Effectiveness goal C, efficient employment of resources: Shipments may be processed more quickly and at a lower cost if errors, differences between the order and the goods to be shipped, are detected and prevented from entering the system.

Security of resources, sales order notification input validity: If there is no open order in the sales order master data or if the shipment quantities exceed the open quantities, the input shipment may not be authorized.

Sales order notification input accuracy: By comparing the input shipping data to the sales order master data, erroneous or suspect input data may be identified.

P-14: *Confirm input acceptance.*

Sales order notification input and update completeness: Ensures input completeness in that the computer informs the shipping clerk that the input shipment data has been accepted and recorded.

M-1: *One-for-one checking of picking tickets with the goods.*

Effectiveness goal C, efficient employment of resources: By comparing the goods to the picking ticket (and correcting any picking errors) in the warehouse, rather than later in shipping, Stockbridge could process shipments in a more timely and efficient manner (the warehouse clerk is in a better position to correct picking errors than is the shipping clerk).

Security of resources: By correcting picking errors, we ensure that only goods that were ordered leave the warehouse.

Sales order notification, input validity and input accuracy: The shipping clerk sends only the quantity of goods that were on the picking ticket, thus ensuring that the goods entered as shipments will be valid and accurate.

M-2: *One-for-one checking of goods, picking ticket, and sales order data.*

Ensure security of resources: By requiring that the sales order data be compared with that on the picking ticket and then that these data sets be compared to the actual goods being shipped, this plan ensures that inventory shipments have been authorized. It also ensures that shipping inputs are represented by an actual shipment of goods.

Sales order notification, input validity and input accuracy: By ensuring that shipping notice inputs are represented by an actual shipment of goods, the goal of shipping notice input validity is addressed. The data that might be checked includes item numbers, quantities, and customer identification. Checking these details also operates to ensure that shipping inputs are accurate.

M-3: *Procedures for rejected inputs.*

Sales order notification input completeness: We are not told what procedures the shipping clerk follows when the goods, the shipping data input, and the open sales order record do not match. These procedures should ensure the correction and re-input of all (i.e., completeness) rejected sales order notifications.

M-4: *One-for-one checking of the packing slip and the goods.*

Sales order notification, input validity, input completeness, and input accuracy: By comparing an output document (the packing slip) to the goods, this check ensures that the input was valid and accurately entered. Any goods with no packing slip would indicate that the sales order notification may not have been entered.

M-5: *Procedures for rejected inputs.*

Sales order notification input completeness: We are not told what procedures the shipping clerk follows when the goods and the packing do not match. These procedures should ensure the correction and re-input of all (i.e., completeness) rejected sales order notifications.

M-6: *Review open sales orders (tickler file).*

Effectiveness goal C: A tickler file of open sales orders maintained in the enterprise database allows the shipping department to investigate any orders that are open for an unreasonable period of time. Therefore, the plan would provide assurance that goods are shipped to customers in a timely manner.

Shipping notice input and update completeness: If action is taken to expedite shipments for *all* open sales orders, the plan would also address the goal of input and update completeness of shipping notices (we are reviewing master data for incomplete shipments).

Solution Note: Several controls not described in the preceding could be included in the solution to this problem, as present or missing, depending on assumptions made. For example:

- At each data entry location, we could include preformatted screens, online prompting, and confirm input acceptance.
- As data is entered into the system, we might find programmed edit checks, populate input screens with master data, and compare input data with master data.
- When there are programmed edit checks, manual comparisons, and reconciliation of batch totals, we might find procedures for rejected inputs.
- Automated data entry is employed where the picking tickets and goods are scanned at shipping.

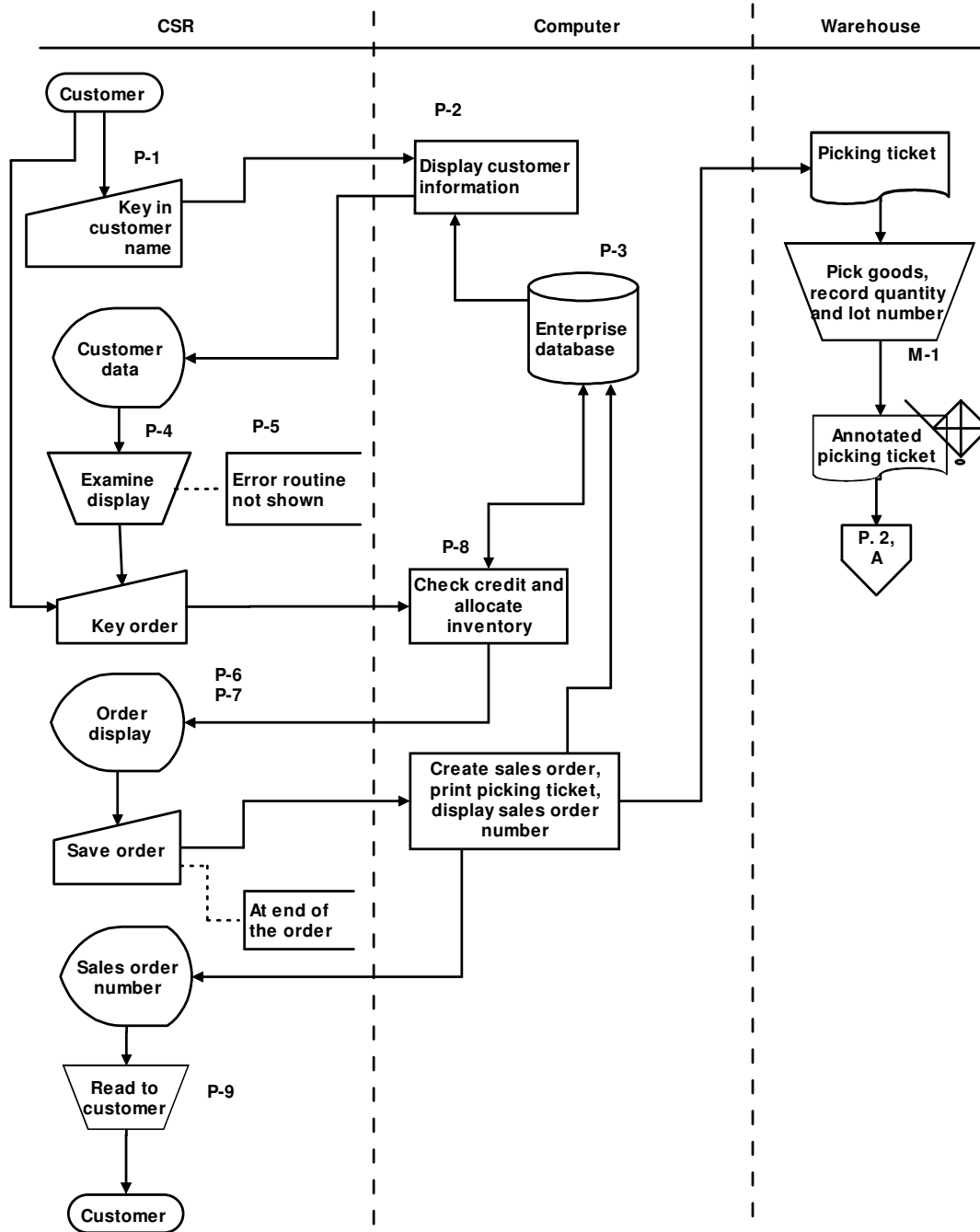
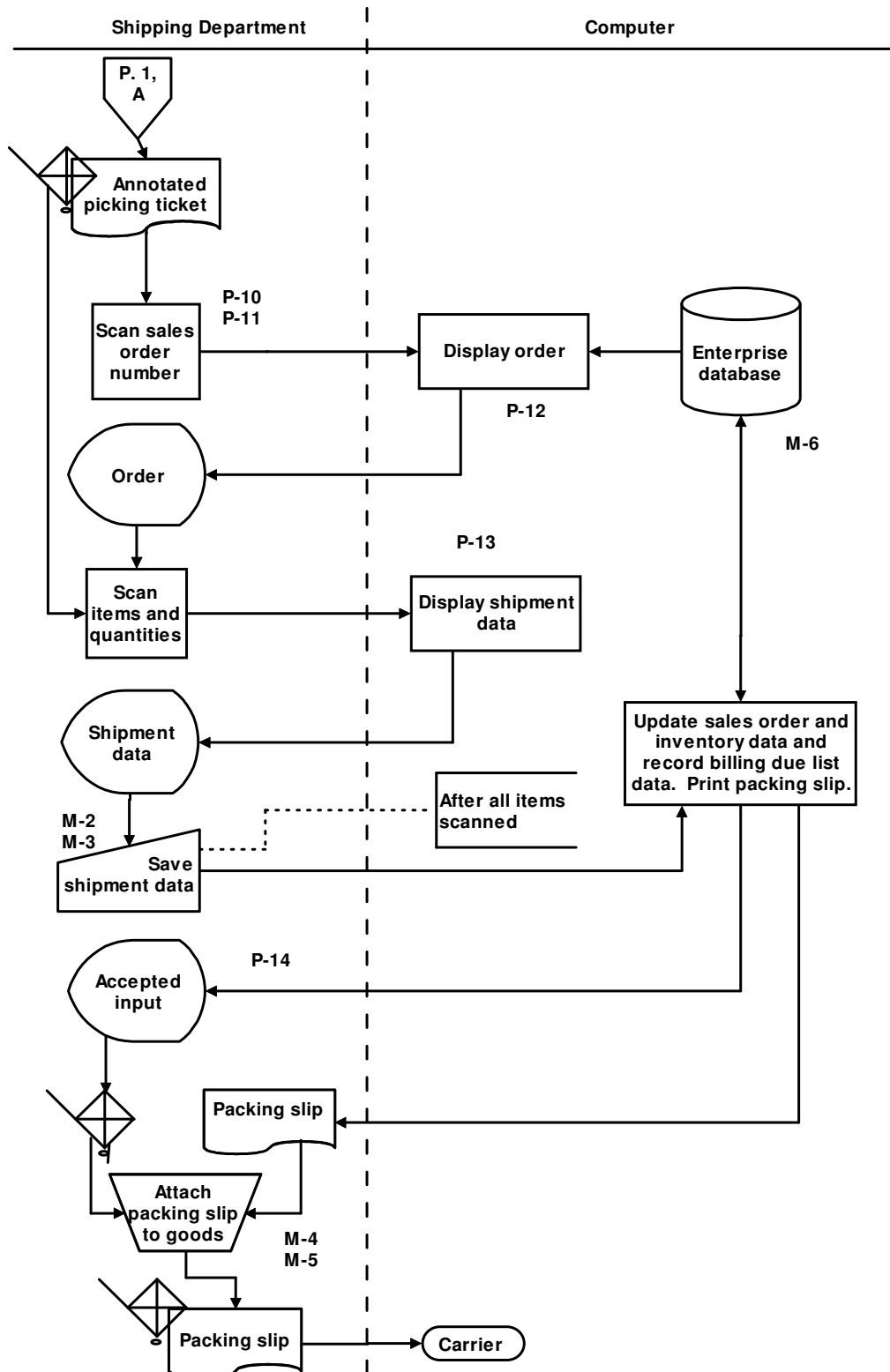


FIGURE SM-10.6 Problem 2, part c solution—annotated systems flowchart for Stockbridge

FIGURE SM-10.6 Stockbridge annotated systems flowchart (*continued*)

Metro Grocers, Inc. Solutions (see *Note* on pg. 10-5)**P10-2 ANS. a. Table of Entities and Activities for Metro Grocers, Inc.**

Entities	Para	Activities
Customer	2	1. Log on to Web site.
Computer	2	2. Read customer database.
	2	3. Confirm username, password, refrigerator installation, and credit.
	2	4. Generate product list.
Customer	2	5. Select (browse and add) products from the Web site.
	2	6. Proceed to checkout and authorize billing amount to be charged to account.
	2	7. Submit order.
Computer	2	8. Allocate inventory in the inventory database.
	2	9. Record order on the order database.
Computer	3	10. Read order database and display electronic picking ticket on handheld.
Warehouse (clerk)	3	11. Read order and pick goods.
	3	12. Scan each item.
	3	13. Place items in box.
Computer	3	14. As each item is scanned, record in the inventory and order databases.
Warehouse (clerk)	3	15. Press button to indicate order completed.
Computer	3	16. Print a bar code.
Warehouse (clerk)	3	17. Attach bar code to box.
	3	18. Send box to delivery services.
Delivery Services	4	19. Scan the bar code.
Computer	4	20. Access and display the order.
Delivery Services	4	21. Check the contents of the box.
	4	22. Load goods for delivery.
	4	23. Key in confirmation of the order contents.
Computer	4	24. Print delivery directions and receipt.

Delivery Services	4	25. Deliver the groceries and receipt to customer.
	4	26. Scan the bar code of the box and select confirm delivery.
Computer	4	27. Record completion of delivery in the order database.
	4	28. Update the customer database for billing.

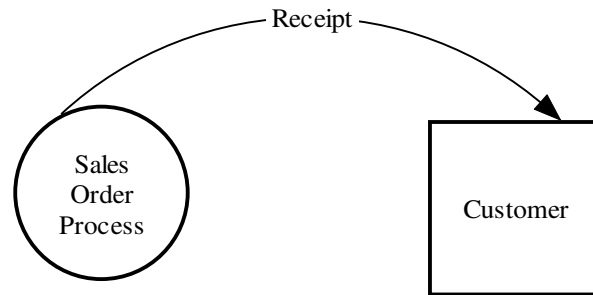
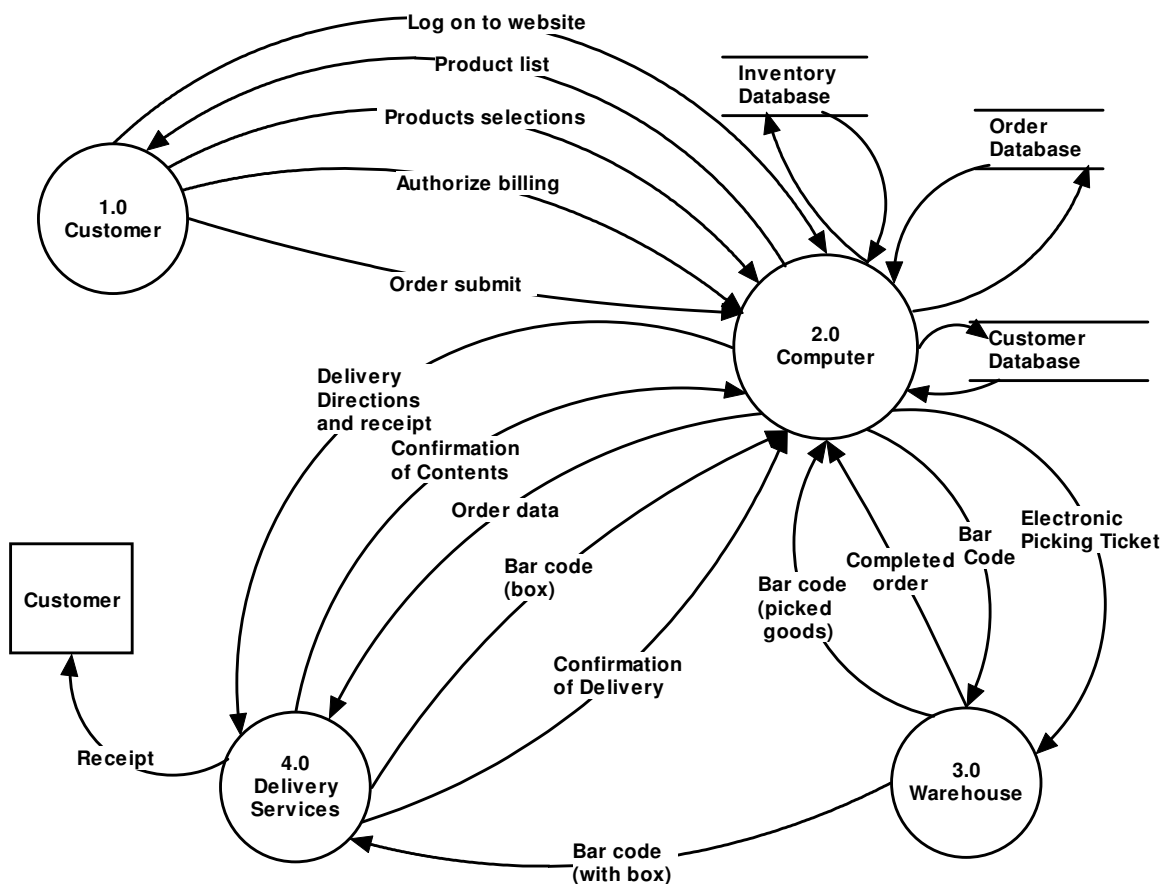


FIGURE SM-10.7 Problem 1, part b solution—context diagram for Metro Grocers, Inc.



NOTE: Only one flow is shown to and one flow from each database. See the logical DFD and the systems flowchart for details

FIGURE SM-10.8 Problem 1, part c solution—physical DFD for Metro Grocers, Inc.

d. Table of Entities and Activities (Annotated) for Metro Grocers, Inc.

Entities	Para	Activities	Process
Customer	2	1. Log on to Web site.	
Computer	2	2. Read customer database.	
	2	3. Confirm username, password, refrigerator installation, and credit.	
		4. Generate product list.	
Customer	2	5. Select (browse and add) products from the Web site.	1.0 Enter Sales Order
	2	6. Proceed to checkout and authorize billing amount to be charged to account.	
	2	7. Submit order.	
Computer	2	8. Allocate items in the inventory database.	
	2	9. Record orders on the order database.	
Computer	3	10. Read order database and display electronic picking ticket.	
Warehouse (clerk)	3	12. Scan each item.	
Computer	3	14. Record each scanned item in the inventory and order databases.	2.0 Assemble Order
Warehouse	3	15. Press button to indicate order completed.	
Computer	3	16. Print a bar code.	
Delivery Services	4	19. Scan the bar code.	
Computer	4	20. Access and display the order.	3.0 Deliver Groceries
Delivery Services	4	23. Key in confirmation of the order contents.	
Computer	4	24. Print delivery directions and receipt.	
Delivery Services	4	26. Scan the bar code of the box and select confirm delivery.	
Computer	4	27. Record completion of delivery in the order database.	4.0 Record Delivery
	4	28. Update the customer database for billing.	

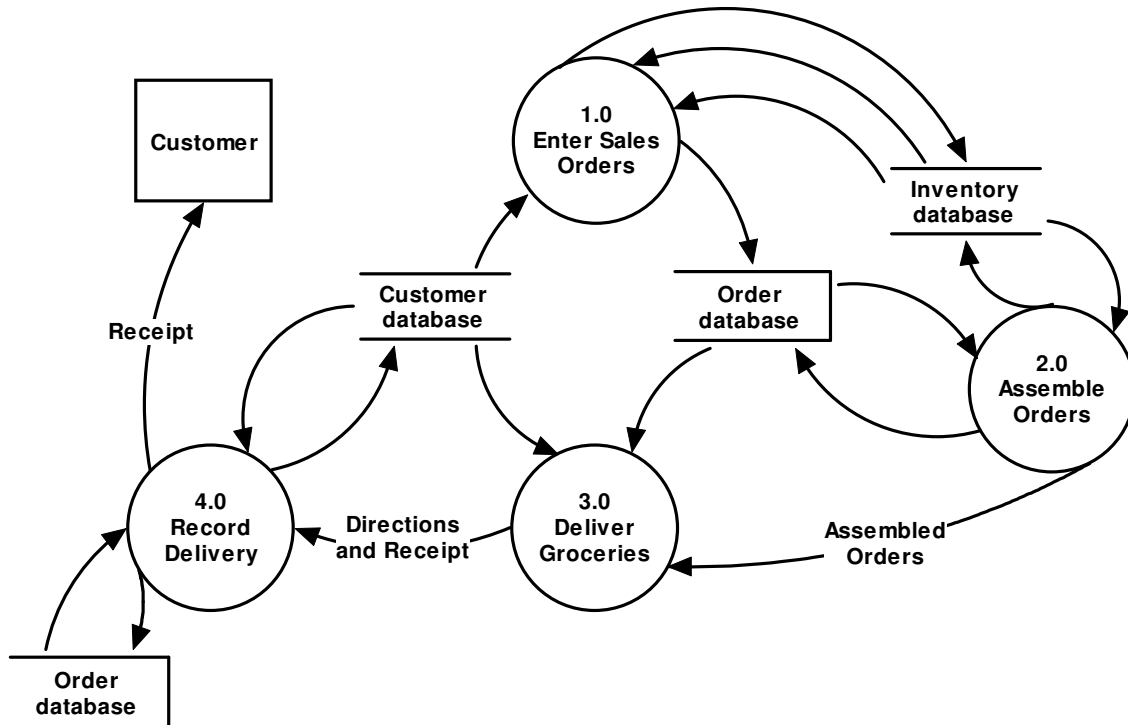


FIGURE SM-10.9 Problem 1, part e solution—logical DFD for Metro Grocers, Inc.

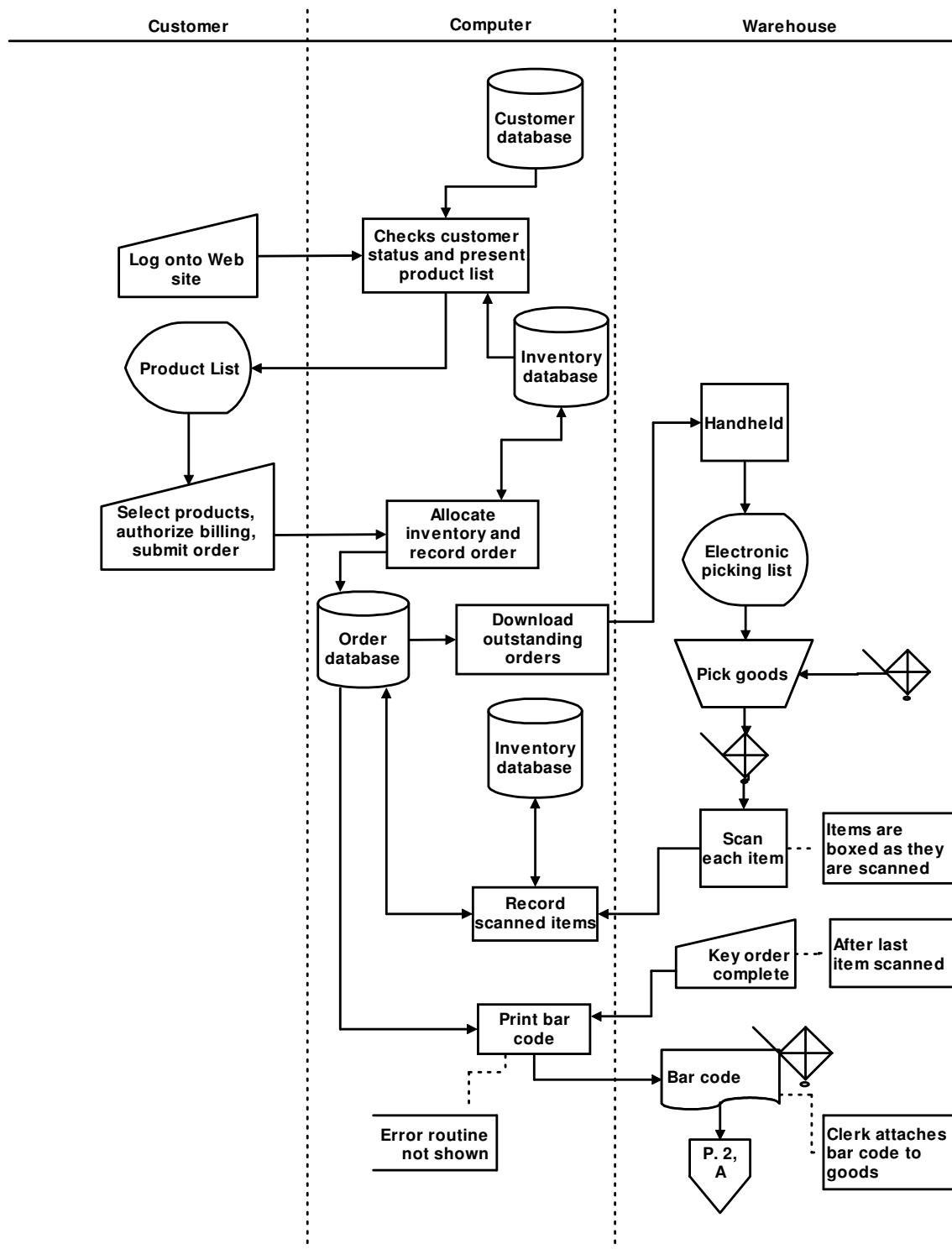
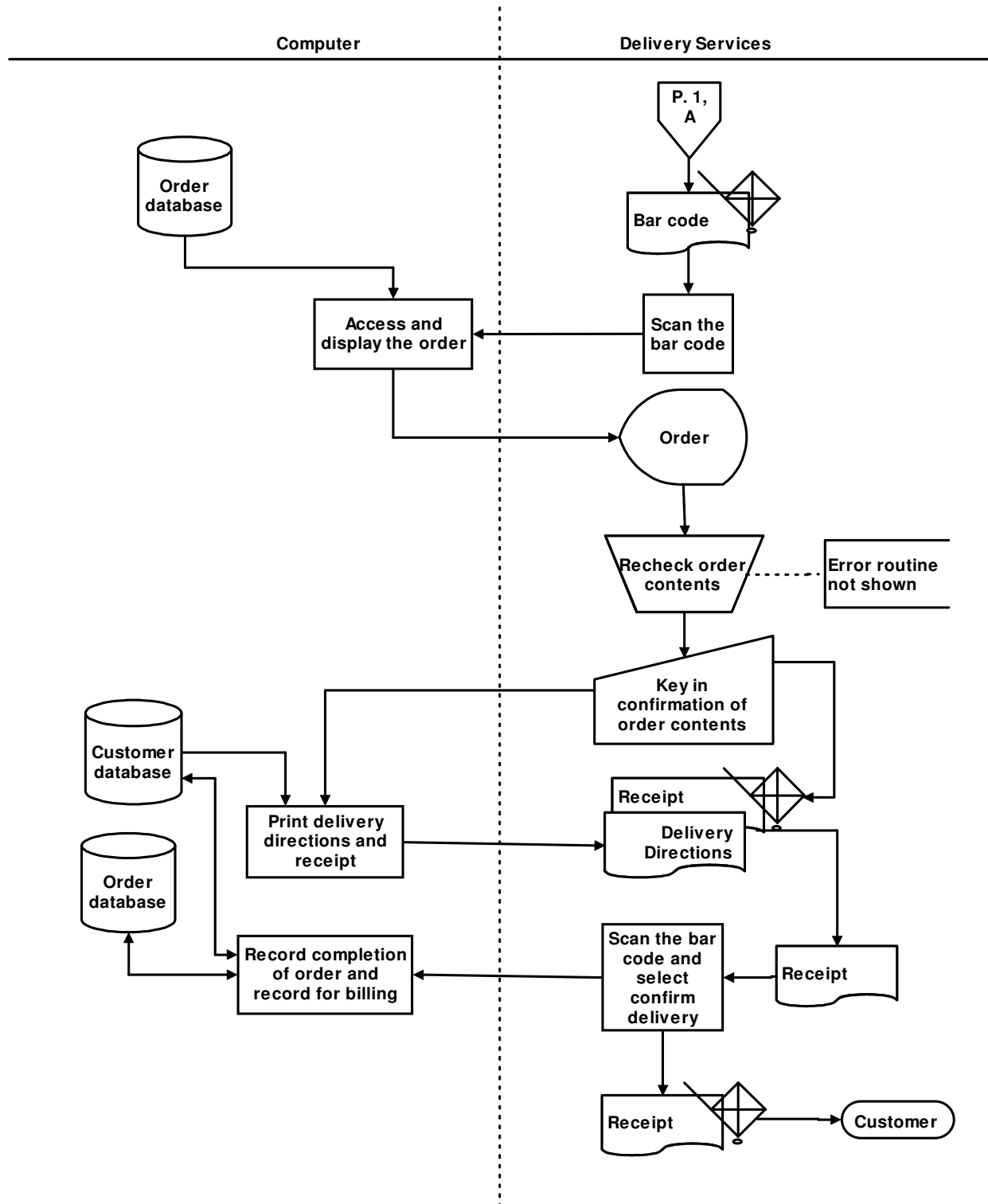


FIGURE SM-10.10 Problem 2, part a solution—systems flowchart for Metro Grocers, Inc.

FIGURE SM-10.10 Metro Grocers systems flowchart (*continued*)

Recommended control plans	Control Goals of the Metro Grocers OE/S Business Process														
	Control Goals of the Operations Process					Control Goals of the Information Process									
	Ensure effectiveness of operations:			Ensure efficient employment of resources (people, computers)	Ensure security of resources (inventory, customer data)	For sales order inputs (i.e., customer orders), ensure:			For sales order master data, ensure:		For sales order notification inputs (i.e., shipment data), ensure:			For sales order master data, ensure:	
	A	B	C			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
	P-11: Compare input data with master data										P-11		P-11		
Missing Controls															
M-1: Compare inputs with master data			M-1		M-1	M-1		M-1							

Possible effectiveness goals include the following:

- A — Provide timely acknowledgement of customer orders
- B — Provide assurance of customer's credit worthiness
- C — Provide timely shipment of goods to customers

IV = input validity

IC = input completeness

IA = input accuracy

UC = update completeness

UA = update accuracy

See Exhibit SM-10.2 for a complete explanation of control plans and cell entries.

FIGURE SM-10.11 Problem 2, part b solution (partial)—control matrix for Metro Grocers, Inc.

Exhibit SM-10.2 Problem 2, part b solution (partial)—explanation of cell entries for control matrix in Figure SM-10.11

Note: All inputs result in immediate updates to master data. Therefore, we do not show entries for UC or UA.

P-1: *Enter data close to the location to where customer order is prepared.*

Effectiveness goals A and C: Customers enter their own orders. This places them in a position to receive an acknowledgement (goal A) immediately and to get the goods shipped quickly (goal C).

Ensure efficient employment of resources: The direct entry of approved orders by the *customer* provides for a more efficient employment of resources because no Metro employees are involved.

Sales order input completeness and input accuracy: The direct entry by the customer provides less chance for the orders to be lost, thus improving input completeness. Because the customer is familiar with their own order and can correct any input errors on the spot, input accuracy should be improved.

P-2: *Customer credit check.*

Effectiveness goal B: The customer's status regarding credit and refrigeration requirements is checked on the customer database. Termination of the event for lack of proper customer status ensures that the organization deals only with customers who have demonstrated an ability to satisfy their liabilities.

Security of resources: Termination of the event for lack of proper customer status ensures that the organization protects its resources by dealing only with customers who have demonstrated an ability to satisfy their liabilities.

Sales order input validity: Because valid sales orders are those that fall within preauthorized credit and refrigeration requirements, this plan also speaks to the goal input validity.

P-3: *Sales order tickler file.*

Effectiveness goal C: A file of open orders is retained in the order database. These orders are automatically presented to the warehouse for picking as scheduled, thus leading to timely shipments.

Efficient employment of resources: The automatic presentation of the orders by the computer relieves the warehouse personnel of the task of tracking down orders to ensure their timely picking.

P-4: *Enter data in the warehouse.*

Security of resources: By recording the reduction of inventory as the goods are picked in the warehouse, Metro is able to keep accurate and current records of the movement of goods and thus reduce pilferage.

Input validity, input completeness, and input accuracy: Because warehouse personnel have the goods on hand as they enter the quantities picked, this input should be valid. Also, there is less chance for the orders to be lost, thus improving input completeness. Because the warehouse personnel have the order and the goods, they can correct any input errors “on the spot,” which should improve input accuracy as well.

P-5: *Confirm input acceptance.*

Security of resources and sales order notification input completeness: The printing of the bar code helps ensure the picked goods have been recorded (input completeness). This allows Metro to keep accurate and current records of the movement of goods and thus reduce pilferage.

P-6: *Turnaround document.*

Effectiveness goal C, efficient employment of resources, and sales order notification input accuracy: By reducing the amount of data that must be input, we improve the speed (effectiveness), productivity (efficiency), and accuracy of the data entry process.

P-7: *Independent shipping authorization.*

Security of resources: To provide security over merchandise inventory, this plan requires that the shipping department have an independent authorization—for example, the record on the order database—to ship inventory to a customer.

Sales order notification input validity: To ensure the validity of shipping notices, this plan requires that the shipping department has an independent authorization—for example, the record on the order database—to ship inventory to a customer.

P-8: *One-for-one checking of goods, picking ticket, and sales order notification.*

Security of resources: By requiring that data on the sales order be compared with that on the picking ticket (bar code) and then that these data sets be compared to the actual goods being shipped, this plan ensures that inventory shipments have been authorized. It also ensures that shipping notice inputs are represented by an actual shipment of goods.

Sales order notification input validity and input accuracy: By ensuring that shipping notice inputs are represented by an actual shipment of goods, the goal of shipping notice input validity is addressed. The data that might be checked includes item numbers, quantities, and customer identification. Checking these details also operates to ensure that shipping events are accurate.

P-9: *Enter shipment data in shipping.*

Effectiveness goal C: By entering the shipment data in shipping, shipments are timelier.

Efficient employment of resources, sales order notification, input completeness, and input accuracy: By entering the shipment data in shipping, the shipment data should not be lost (completeness) and accurately input by personnel familiar with the event and can correct any input errors and do so more quickly (efficiency).

P-10: *Turnaround document.*

Effectiveness goal C: By reducing the amount of data that must be input, we improve the speed and productivity of the data entry personnel.

Sales order notification input validity and input accuracy: By using the bar code to record the delivery, we are sure that the shipment was based on a legitimate customer order, and we reduce data entry errors.

P-11: *Compare input data with master data.*

Sales order notification input validity and input accuracy: The comparison of input data with order master data ensures that recorded shipments are based on actual orders. Any discrepancy noted should be corrected to ensure input accuracy.

M-1: *Compare input data with master data.*

Effectiveness goal C: If the picked goods were compared to the order, database errors would be eliminated early in the process and lead to a more timely shipment.

Security of resources, sales order input validity, and accuracy: By comparing the picked goods to the order database, we will reduce the possibility of unauthorized shipments (security, validity), and we will ensure that shipments will be recorded inaccurately (input accuracy).

Solution Note: Several controls not described in the preceding list could be included in the solution to this problem, as present or missing, depending on assumptions made. For example:

- At each data entry location, we could include automated data entry, preformatted screens, online prompting, and confirm input acceptance.

- As data is entered into the system, we might find programmed edit checks, populate input screens with master data, and compare input data with master data.
- With programmed edit checks, manual comparisons, and reconciliation of batch totals, we might find procedures for rejected inputs.
- Where paper documents are employed, we might find document design, written approvals, and turnaround documents.
- At the Metro customer database, we could add the missing control: independent customer master data maintenance.

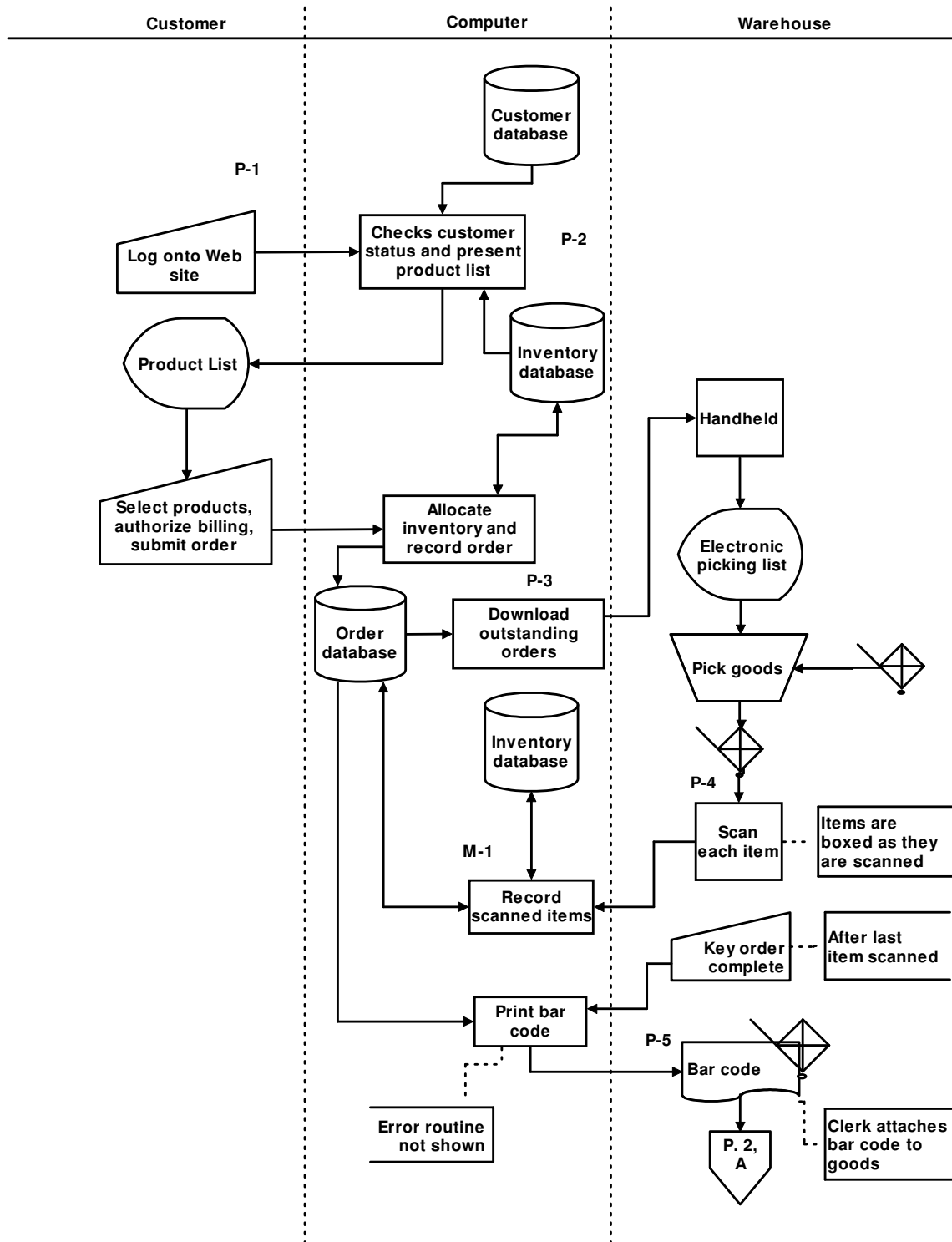
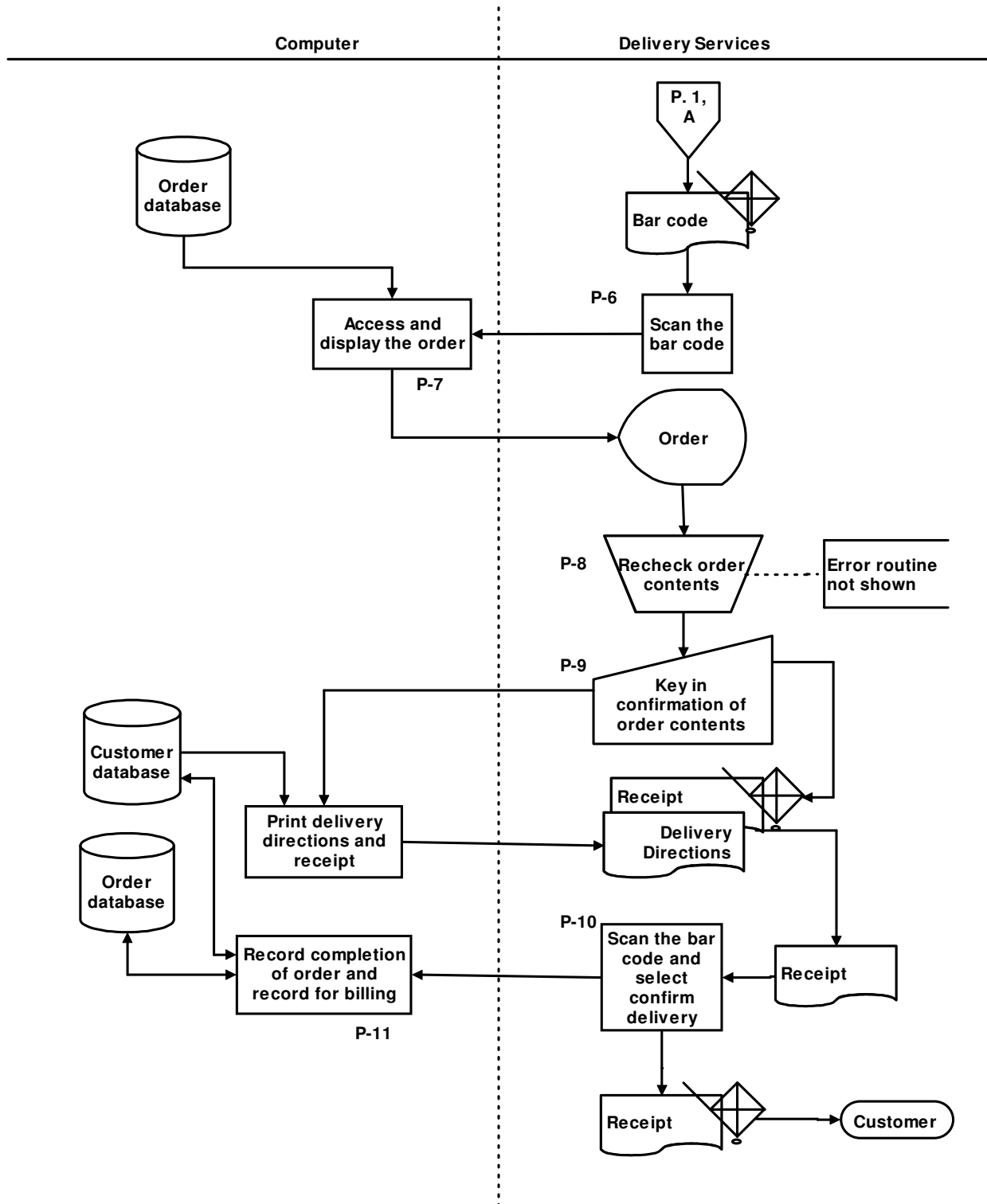


FIGURE SM-10.12 Problem 2, part c solution—annotated systems flowchart for Metro Grocers, Inc.

FIGURE SM-10.12 Metro Grocers annotated systems flowchart (*continued*)

Office Warehouse, Inc. Solutions (see *Note* on pg. 10-5)**P10-1 ANS. a. Table of Entities and Activities for Office Warehouse, Inc.**

Entities	Para	Activities
Customer	2	1. Call in and give customer ID and name.
Order entry (clerks)	2	2. Enter customer number.
Computer	2	3. Retrieve and display the customer data.
Order entry (clerks)	2	4. Compare name to display.
Customer	2	5. Give order.
Order entry (clerks)	2	6. Key in order.
Computer	2	7. Verify that the order does not exceed credit balance.
	3	8. Create an entry in the sales order event data store and allocate inventory.
	3	9. Process the sales event data against the customer and inventory data and record in sales order master data store.
	3	10. Print customer acknowledgment.
	3	11. Print picking ticket.
Mailroom (clerk)	3	12. Mail acknowledgement to customer.
Warehouse (clerk)	3	13. Assemble the order.
	4	14. Forward completed orders to shipping department.
Shipping department (clerk)	4	15. Key sales order number into computer.
Computer	4	16. Access and display the sales order master data.
Shipping department (clerk)	4	17. Key in the items and quantities being shipped.
Computer	4	18. Display the shipment data.
Shipping department (clerk)	4	19. Accept the (shipment) input.
Computer	4	20. Update the sales order master data and inventory (for the shipment).
	4	21. Create a record on the billing due data store.
	4	22. Print a packing slip and bill of lading.
Shipping department (clerk)	4	23. Give shipping documents and goods to carrier.
Carrier	4	

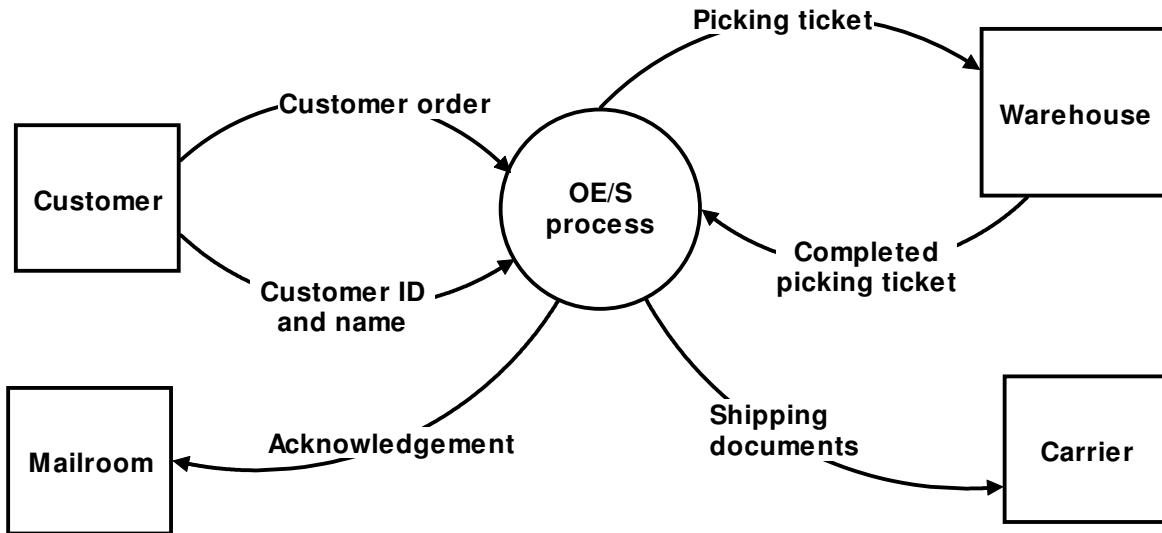
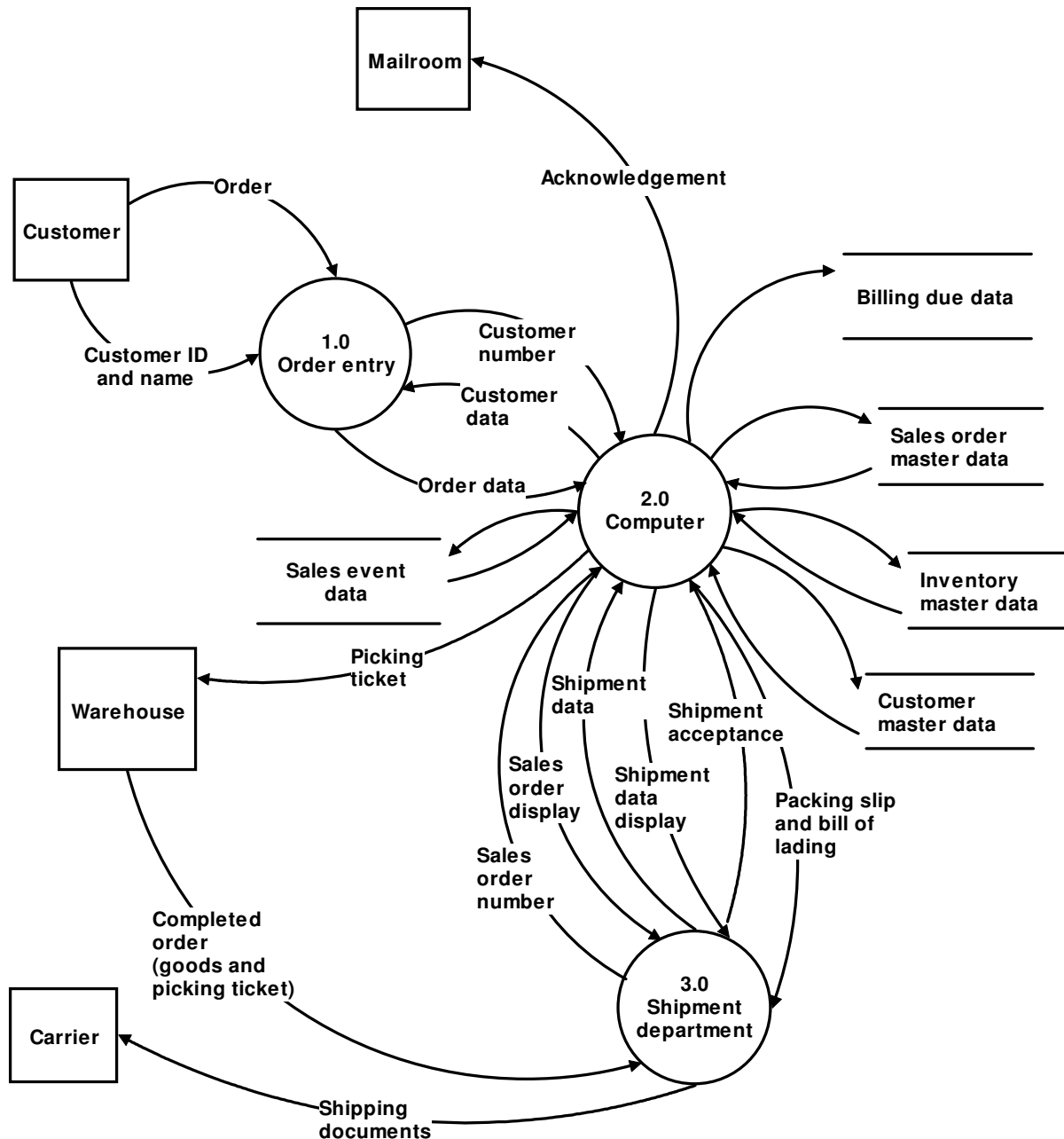


FIGURE SM-10.13 Problem 1, part b solution—context diagram for Office Warehouse, Inc.



NOTE: Only one flow is shown for each flow out of or into a data store/table. See the logical DFD and the systems flowchart for details.

FIGURE SM-10.14 Problem 1, part c solution—physical DFD for Office Warehouse, Inc.

d. Table of Entities and Activities (Annotated) for Office Warehouse, Inc.

Entities	Para	Activities	Process
Order entry (clerks)	2	2. Enter customer number.	<i>1.0 Validate and record customer order</i>
Computer	2	3. Retrieve and display the customer data.	

Order entry (clerks)	2	4. Compare name to display.	
	2	5. Key in the order.	
Computer	2	7. Verify that the order does not exceed credit balance.	
	3	8. Create an entry in the sales event data store and allocate inventory.	
<hr/>			
Computer	3	9. Process the sales event data against the customer and inventory data and record in sales order master data store.	
	3	10. Print customer acknowledgment.	
	3	11. Print picking ticket.	
Shipping department (clerk)	4	15. Key sales order number into computer.	2.0 Process order
Computer	4	16. Access and display the sales order master data.	
Shipping department (clerk)	4	17. Key in the items and quantities being shipped.	
<hr/>			
Computer	4	18. Display the shipment data.	
Shipping department (clerk)	4	19. Accept the (shipment) input.	
Computer	4	20. Update the sales order master data and inventory (for the shipment).	3.0 Ship order
	4	21. Create a record on the billing due data store.	
	4	22. Print a packing slip and bill of lading.	
<hr/>			

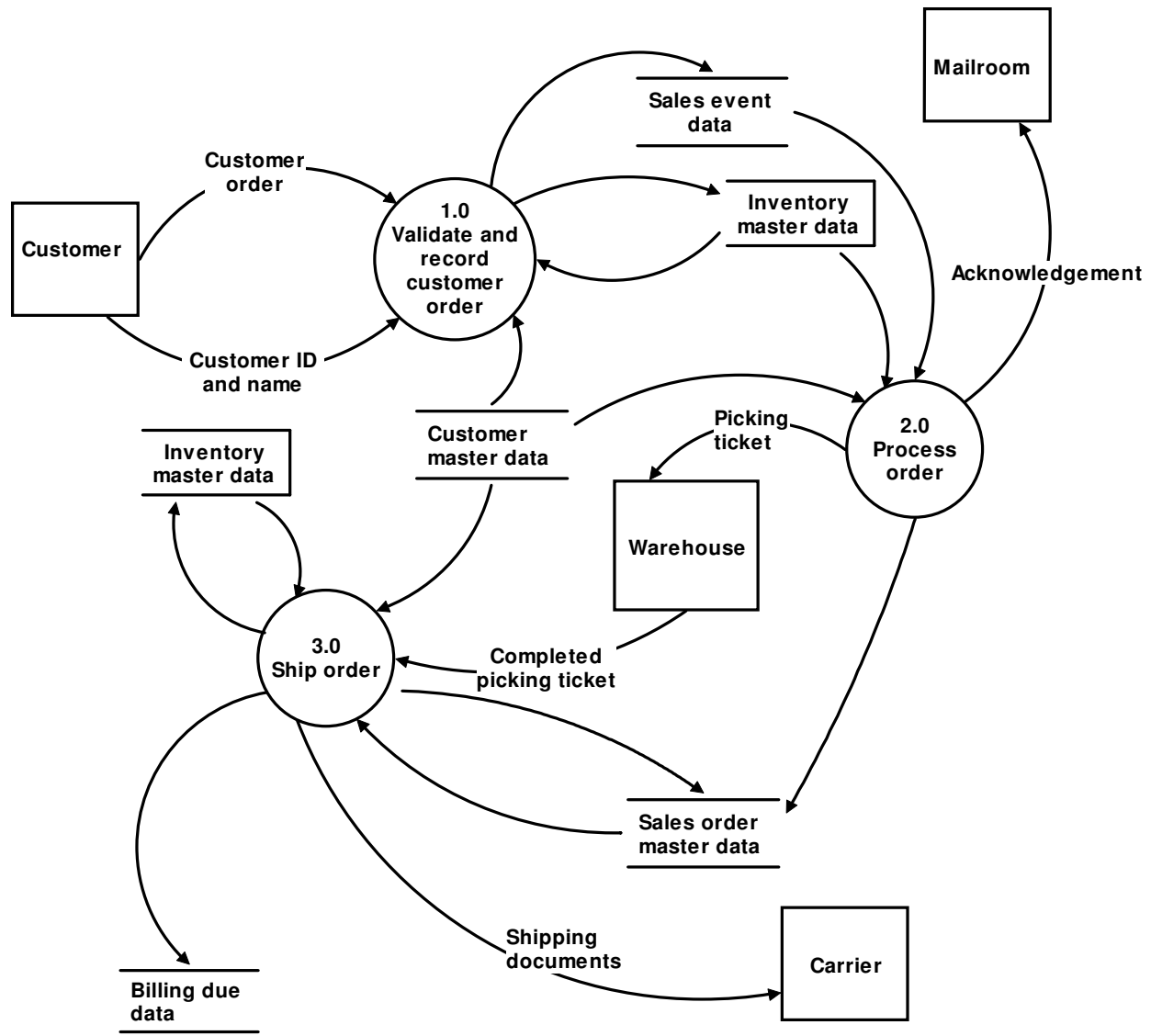


FIGURE SM-10.15 Problem 1, part e solution—logical DFD for Office Warehouse, Inc.

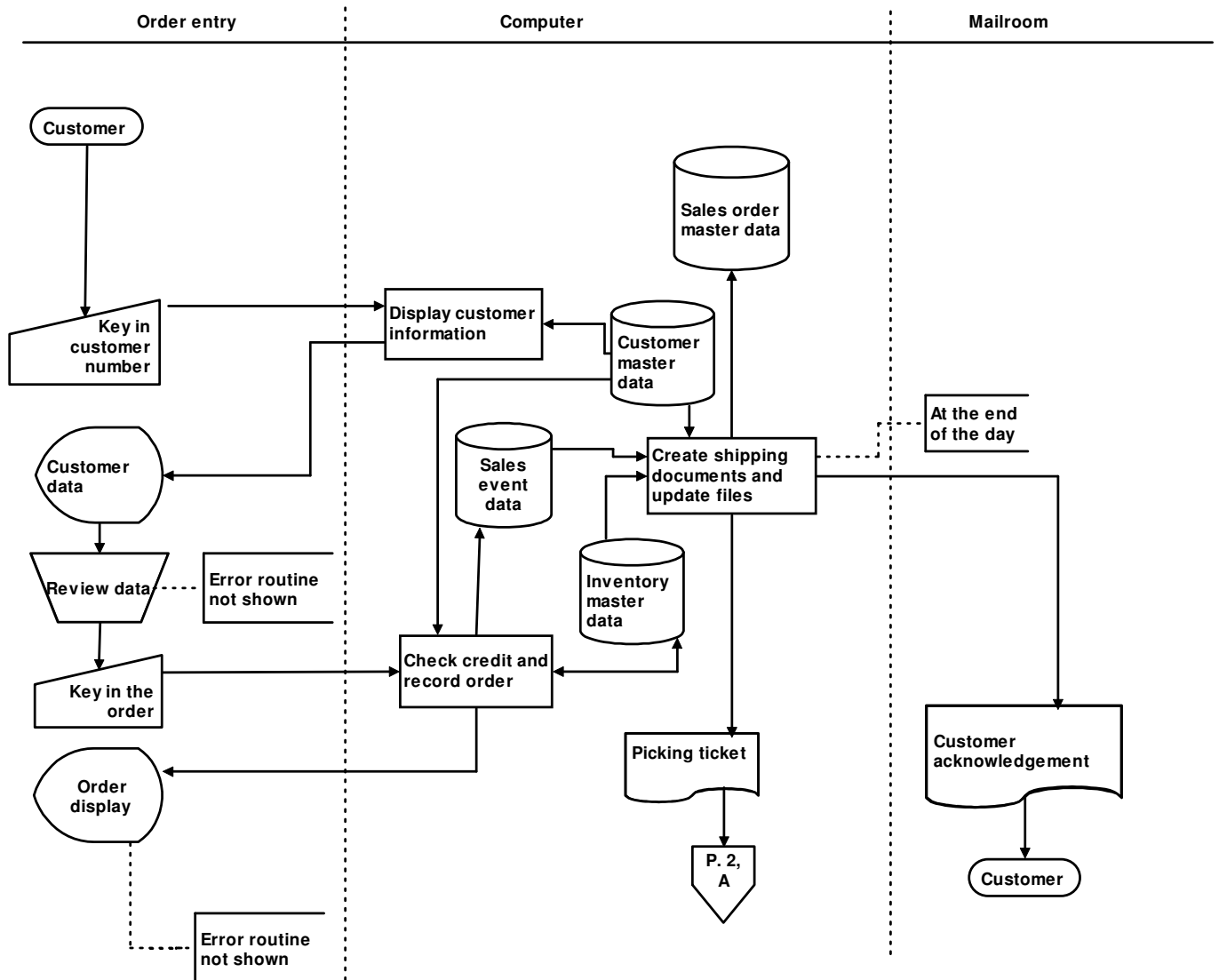


FIGURE SM-10.16 Problem 2, part a solution—systems flowchart for Office Warehouse, Inc.

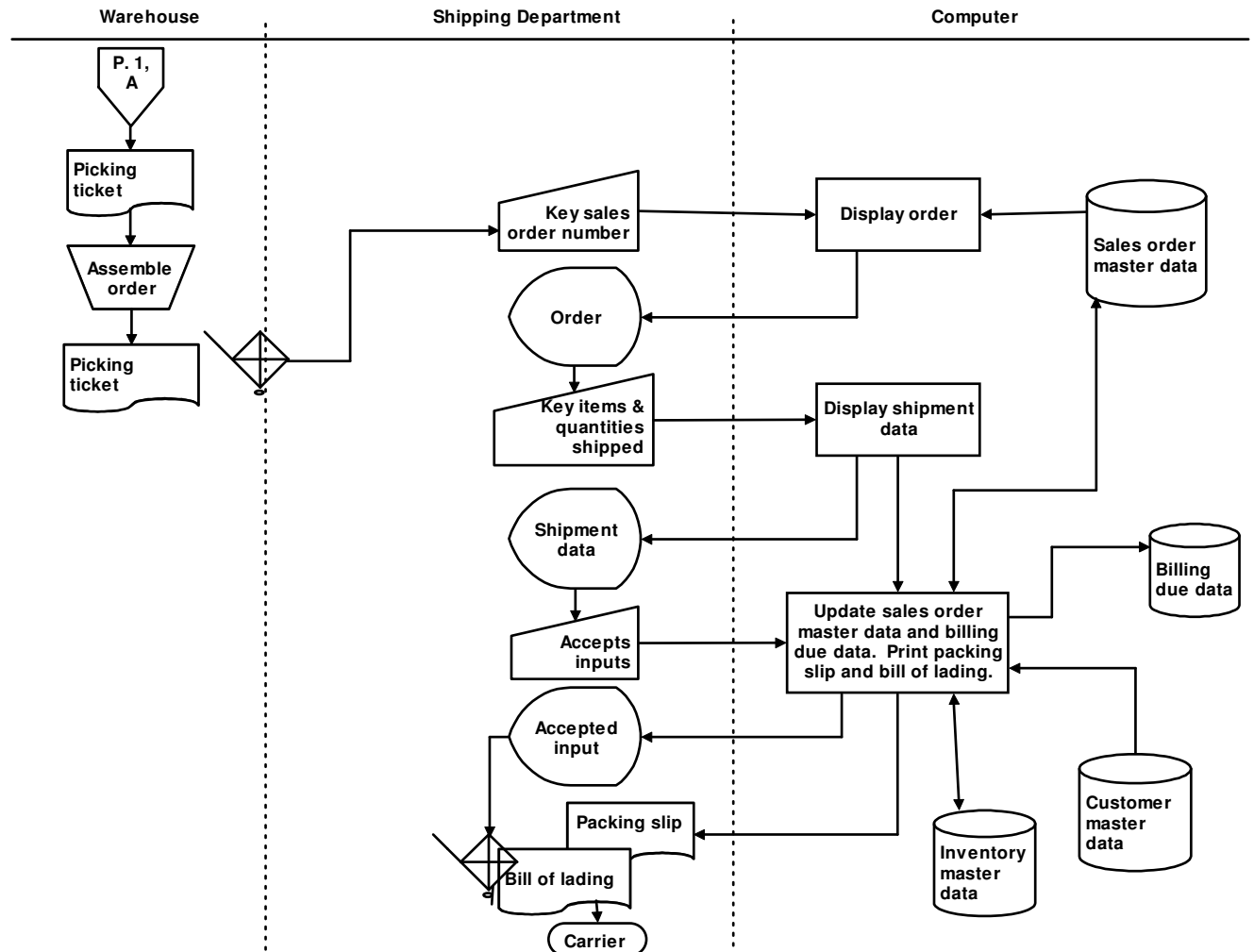


FIGURE SM-10.16 Office Warehouse, Inc. systems flowchart (*continued*)

Recommended control plans	Control Goals of the Office Warehouse, Inc. OE/S Business Process														
	Control Goals of the Operations Process					Control Goals of the Information Process									
	Ensure effectiveness of operations:			Ensure efficient employment of resources (computers, people)	Ensure security of resources (inventory, customer data)	For sales order inputs (i.e., customer orders), ensure:			For sales order master data, ensure:		For sales order notification inputs (i.e., shipment data), ensure:			For sales order master data, ensure:	
	A	B	C			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
Present controls															
P-1: Enter order close to the location where it is prepared	P-1		P-1	P-1			P-1	P-1							
P-2: Populate input screen with master data	P-2		P-2	P-2		P-2		P-2							
P-3: Compare input data with master data					P-3	P-3									
P-4: Customer credit check		P-4			P-4	P-4									
P-5: Enter shipment data in shipping			P-5	P-5							P-5	P-5	P-5		
P-6: Independent shipping authorization					P-6						P-6				
P-7: Confirm input acceptance												P-7		P-7	
Missing Controls															
M-1: Record quantities picked					M-1						M-1		M-1		

Recommended control plans	Control Goals of the Office Warehouse, Inc. OE/S Business Process														
	Control Goals of the Operations Process					Control Goals of the Information Process									
	Ensure effectiveness of operations:			Ensure efficient employment of resources (computers, people)	Ensure security of resources (inventory, customer data)	For sales order inputs (i.e., customer orders), ensure:			For sales order master data, ensure:	For sales order notification inputs (i.e., shipment data), ensure:			For sales order master data, ensure:		
	A	B	C			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
	M-2: One-for-one checking of goods, picking ticket, and sales order					M-2						M-2		M-2	
M-3: One-for-one checking of packing slip and goods											M-3	M-3	M-3	M-3	M-3

Possible effectiveness goals include the following:

A — Provide timely acknowledgement of customer orders

B — Provide assurance of customer's credit worthiness

C — Provide timely shipment of goods to customers

IV = input validity

IC = input completeness

IA = input accuracy

UC = update completeness

UA = update accuracy

See Exhibit SM-10.3 for a complete explanation of control plans and cell entries.

FIGURE SM-10.17 Problem 2, part b solution (partial)—control matrix for Office Warehouse, Inc.

Exhibit SM-10.3 Problem 2 part b solution (partial)—explanation of cell entries for control matrix in Figure SM-10.17

P-1: *Enter data close to the location to where customer order is prepared.*

Effectiveness goals A and C: Orders are entered by sales clerks while the customer is on the phone. This places them in a position to give the customer an immediate acknowledgement (goal A) and to get the goods shipped quickly (goal C) as no order entry step intervenes.

Efficient employment of resources: The direct entry of approved orders by order provides a more efficient employment of resources because no additional Office Warehouse, Inc. employees are involved.

Sales order input completeness and input accuracy: The direct entry by order entry provides less chance for the orders to be lost, thus improving input completeness. Because the clerk has the customer on the phone and can correct any input errors “on the spot,” input accuracy should be improved.

P-2: *Populate input screens with master data.*

Effectiveness goals A and C: Fewer operator keystrokes should also improve the speed with which events can be processed.

Efficient employment of resources: Populating inputs with master data can improve the efficiency of online processes by reducing the quantity of data that an operator must enter into a computer.

Sales order input validity: The data entry process can only proceed if there is an authorized customer record in the customer database.

Sales order input accuracy: Fewer operator keystrokes should further improve the accuracy of data entry.

P-3: *Compare input data with master data.*

Security of resources and sales order input validity: The order entry clerk compares the input customer number and name to the computer display to ensure that orders are input only for customers who are known to exist and will likely pay for merchandise received. The record that is retrieved from the customer database determines that the customer has been approved.

P-4: *Customer credit check.*

Effectiveness goal B: The customer’s credit limit is checked on the customer master data. By dealing only with customers who have demonstrated an ability to satisfy their liabilities, they reduce losses.

Security of resources: Termination of the event for lack of credit ensures that the organization protects its resources by dealing only with customers who have demonstrated an ability to satisfy their liabilities.

Sales order input validity: Valid sales orders are those that fall within preauthorized credit limits, so this plan also speaks to the goal input validity.

P-5: *Enter shipment data in shipping.*

Effectiveness goal C: By entering the shipment data in shipping, shipments are timelier.

Efficient employment of resources: By entering the shipment data in shipping, resources are more efficiently used than they would be if Office Warehouse, Inc. sent the shipping notices to a separate data entry function.

Sales order input validity: The entry of the shipment is undertaken by shipping clerks who, presumably, are in possession of goods that will actually be shipped.

Sales order notification input completeness and input accuracy: By entering the shipment data in shipping, the shipment data should not be lost (completeness) and should be accurately input by personnel familiar with the event who can correct any input errors on the spot.

P-6: *Independent shipping authorization.*

Security of resources: To provide security over merchandise inventory, the shipping department has an independent authorization—the record on the sales order master data—to ship inventory to a customer.

Sales order notification input validity: To ensure the validity of shipping notices, the shipping department has an independent authorization—the record on the sales order master data—to record a shipment.

P-7: *Confirm input acceptance.*

Sales order notification input completeness: The computer informs the user that the input has been accepted and recorded.

Sales order master data update completeness: We also have an entry in the UC column of the control matrix for the shipment data input because the clerk is informed of the acceptance after recording of the input *and* update of the master data, which occur concurrently.

M-1: *Record quantities picked.*

Security of resources: If the warehouse were to record on the picking ticket the actual quantities picked, we would have a record of inventory movements and less chance for inventory pilferage.

Sale order notification input validity and input accuracy: If the warehouse personnel were to record the actual quantities picked, shipment inputs would be based on actual quantities picked and about to be shipped.

M-2: *One-for-one checking of goods, picking ticket, and sales order notification.*

Security of resources: By requiring that data on the sales order notification be compared with that on the picking ticket and then that these data sets be compared to the actual goods being shipped, this plan ensures that inventory shipments have been authorized. It also ensures that shipping notice inputs are represented by an actual shipment of goods.

Sales order notification input validity and input accuracy: By ensuring that shipping notice inputs are represented by an actual shipment of goods, the goal of shipping notice input validity is addressed. The data that might be checked includes item numbers, quantities, and customer identification. Checking these details also ensures that shipping events are accurate.

M-3: *One-for-one checking of the packing slip and the goods.*

Sales order notification input validity, input completeness, input accuracy: By comparing an output document (the packing slip) to the goods, this checking ensures that the input was valid and accurately entered. Any goods with no packing slip would indicate that the sales order notification may not have been entered.

Sales order master data update completeness, update accuracy: Because the comparison is made after the sales order master data is updated, this checking will ensure that the sales order master data was completely and accurately updated.

Solution Note: Several controls not described in the previous list could be included in the solution to this problem, as present or missing, depending on assumptions made. For example:

- At each data entry location, we could include preformatted screens, online prompting, and confirm input acceptance.
- As data is entered into the system, we might find automated data entry, programmed edit checks, populate input screens with master data, and compare input data with master data.
- When there are programmed edit checks, manual comparisons, and reconciliation of batch totals, we might find procedures for rejected inputs.
- Where paper documents are employed, we might find document design, written approvals, and turnaround documents.
- At the Office Warehouse, Inc. customer database, we could add the missing control: independent customer master data maintenance.

- Because the narrative is silent on this point, we could describe as a missing control the review of open sales orders (tickler file) to ensure timely shipments and entry of those shipments (i.e., input completeness of shipping notices).

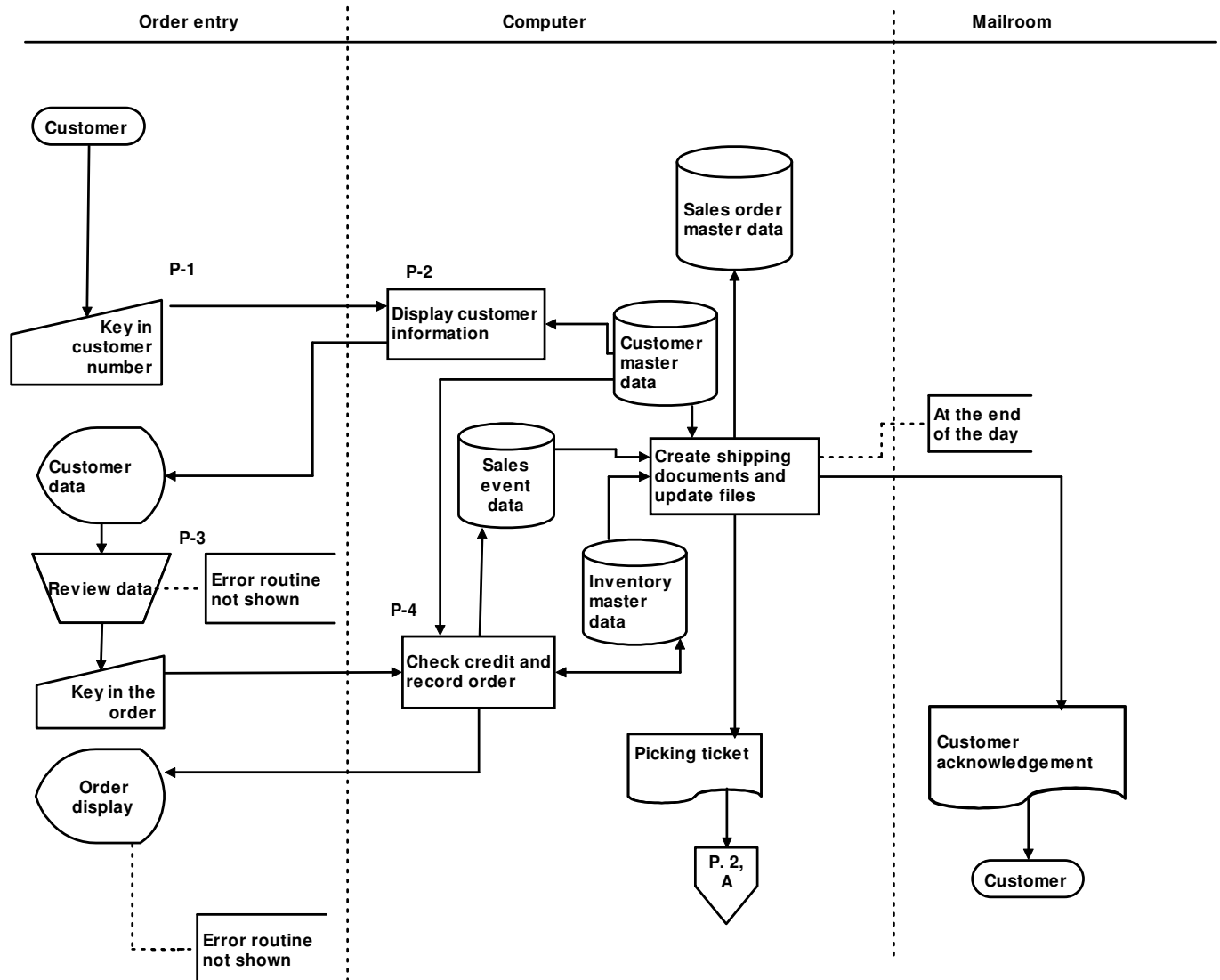


FIGURE SM-10.18 Problem 2, part c solution—annotated systems flowchart for Office Warehouse, Inc.

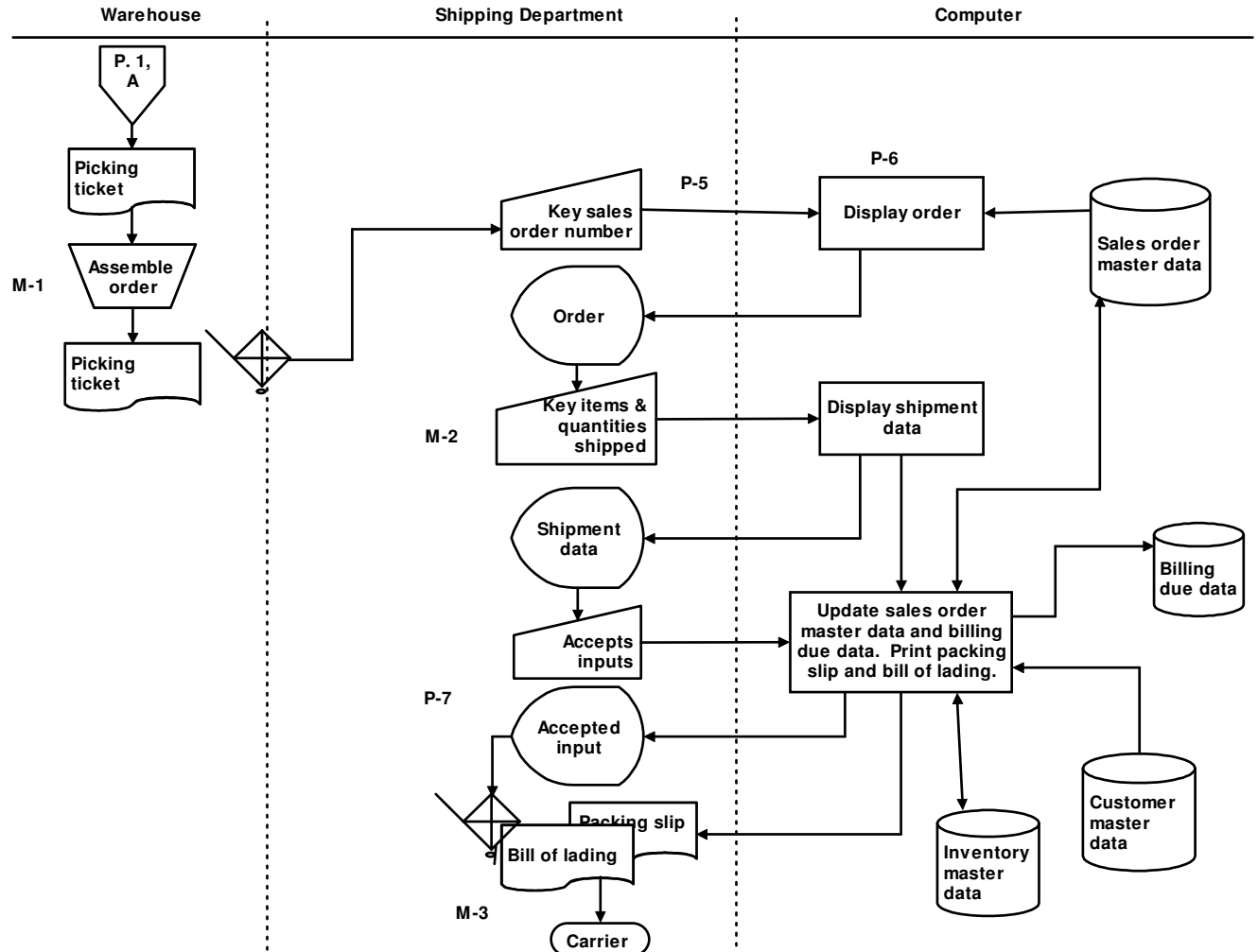


FIGURE SM-10.18 Office Warehouse, Inc. annotated systems flowchart (*continued*)

